

**IN THE CLAIMS**

1. (currently amended) A quadrupole ion trap for use in a mass spectrometer comprising:

- a) a ring electrode,
- b) a pair of end caps,
- c) an RF trapping voltage source for applying a trapping voltage to the ring electrode, and
- d) computer controlled apparatus for selectively applying pre-calculated waveforms to the end caps for isolating an ion with a specific mass to charge ratio, said computer controlled apparatus comprising a memory for storing a library of optimized notched waveforms, each said waveform being pre-calculated for a specific mass and wherein the memory further comprises a library of single frequency CID waveforms for use in collision induced dissociation of an isolated ion.

2-3, inclusive: cancel

4. (currently amended) The quadrupole ion trap as defined by claim [3] 1, wherein the computer controlled apparatus further comprises a digital to analog converter for converting digital data from the memory to an analog signal, and an amplifier for amplification of the analog signal.

5. (currently amended) The quadrupole ion trap as defined by claim [2] 1, wherein the computer controlled apparatus further comprises a digital to analog converter for converting digital data from the memory to an analog signal, and an amplifier for amplification of the analog signal.

6. (original) The quadrupole ion trap as defined by claim 1, and further comprising a trapping parameter adjusting means for matching secular frequency of a particular ion to a central frequency of the pre-calculated waveform.

7. (original) The quadrupole ion trap as defined by claim 6, wherein the trapping parameter adjusting means adjusts amplitude of the trapping voltage.

8. (currently amended) In a quadrupole ion trap mass spectrometer having a ring electrode, a pair of end caps, an RF trapping generator, the improvement comprising:

computer controlled apparatus for selectively applying pre-calculated waveforms to the end caps for isolating an ion with a specific mass to charge ratio, said computer controlled apparatus includes a memory for storing a library of optimized notched waveforms, each said waveform being pre-calculated for

a specific mass and wherein the memory further comprises a library of single frequency CID waveforms for use in collision induced dissociation of an isolated ion.

9-10, inclusive: cancel

11. (original) The improvement as defined by claim 8, wherein the computer controlled apparatus further comprises a trapping parameter adjusting means for matching secular frequency of a particular ion to a central frequency of the pre-calculated waveform.

12. (original) The improvement as defined by claim 11, wherein the trapping parameter is an amplitude of a RF trapping voltage.

13. (currently amended) In a method of isolating a selected parent ion having a mass, M, for MS/MS spectrometry employing a quadrupole ion trap (QIT), said QIT having a ring electrode, a pair end caps, an RF trapping voltage source for applying the trapping voltage to the ring electrode, and an RF voltage source connected to the end caps, said method including the steps of:

- a) storing pre-calculated waveforms for isolating ions of specific mass to charge ratios, and providing a computer controlled memory for storing a library of digitally defined optimized notched waveforms, each said waveform being pre-calculated for a specific mass, and further including storing a library of single frequency CID waveforms for use in collision induced dissociation of an isolated ion,
- b) selectively applying a pre-calculated waveform to the end caps for isolating an ion with specific mass to charge ratio.

14. Cancel.

15. (currently amended) The method as defined by claim [14] 13, wherein step b) includes providing a digital to analog converter for converting digital data from the memory to an analog signal, and an amplifier for the analog signal.

16. cancel

17. (currently amended) The method as defined by claim [16] 15, wherein step b) includes providing a digital to analog converter for converting digital data from the memory to an analog signal, and an amplifier for the analog signal.

18. (original) The method as defined by claim 13, further including the step of:  
adjusting a trapping parameter for matching secular frequency of a particular ion to a central  
frequency of the pre-calculated waveform.
19. (original) The method as defined by claim 18, wherein the trapping parameter is RF trapping voltage  
amplitude.